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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,311	02/11/2004	Anthony J. Kinney	BB1538USNA	4023

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EXAMINER	
BAGGOT, BRENDAN O	

ART UNIT	PAPER NUMBER
1638	

DATE MAILED: 08/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/776,311	KINNEY ET AL.	
	Examiner	Art Unit	
	Brendan O. Baggot	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-139* is/are pending in the application.

4a) Of the above claim(s) *2-10,13-15,19-25 and 29-139* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,11,12,16-18 and 26-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/6/04; 7/20/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Restriction / Election

1. The Office acknowledges the receipt of Applicant's restriction election, filed 5/5/06. Applicant elects Group I, claims 1, 11, 12, 16-18, and 26-28, without traverse. Claim 1-139 are pending. Claims 2-10, 13-15, 19-25, 29-139 are withdrawn from consideration. Claims 1, 11, 12, 16-18, and 26-28 is/are examined in the instant application.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

This restriction is made FINAL.

Sequence Listing

2. Applicant's computer readable format sequence listing has been entered.

Information Disclosure Statement

3. An initialed and dated copy of Applicant's IDS, filed 8/6/04, is attached to the instant Office Action.

Specification

4. The disclosure is objected to because of the following: Example 4, Ln. 17 refers to a "pKR274" in "Figure 3." Figure 3 recites a pKR274-2. *See* pages 41 and 61, for example.

Appropriate correction is required.

Claim Objections

5. Claims 16-18, 26-28 are objected to because of the following informalities: the claims are dependent from non-elected Claims. Appropriate correction is required.

Claim Rejections - 35 U.S.C. §101

35 U.S.C. §101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 1, 11, 12, 16-18, and 26-28 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claimed inventions are directed to non-statutory subject matter encompassing untransformed plants and seeds which are products of nature. Since the claim encompasses compositions that lack a transgene, the claim encompasses plants and seeds that are indistinguishable from plants and seeds that would occur in nature. *See Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 33 U.S. 127 (1948), *Diamond v. Chakrabarty*, 206 USPQ 193 (1980).

Claim Rejections - 35 U.S.C. §112, first paragraph, enablement

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1, 11, 12, 16-18, and 26-28 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for an soybean comprising a total seed fatty acid profile no more than 19.6% of EPA, no more than 3.1% of DHA, or no more than 1-4.7% of DPA, transformed with Mad5, Sdd17, and either Sdd6 or Mad6, does not reasonably provide enablement for any oilseed plant that produces mature seeds in which the total seed fatty acid profile comprises up to 1-60% of at least one of *any* polyunsaturated fatty acid having exemplified and non-exemplified chain length and carbon-carbon double bond pattern. Moreover, Applicant has not enabled any plant species, any mutant or wild-type, both exemplified and non-exemplified, lacking sufficient oil pathway precursors to achieve 1-60% of PUFAs. Furthermore, Applicant has not enabled the production of non-plant PUFAs, previously unknown PUFAs, synthetic PUFAs, or plant toxic PUFAs.

The claims are broadly drawn to *any* oilseed plant species or *any* oilseeds that produce seeds with a total seed fatty acid profile comprising at least 1.0% to at least 60% of *any* polyunsaturated fatty acid having at least twenty carbon atoms and five or more carbon-carbon double bonds, including where the PUFA is an omega-3 fatty acid (FA), and including where the omega-3 FA is EPA, DPA, or DHA.

Applicants teach a soybean comprising a total seed fatty acid profile with no more than 19.6% of EPA (Event 3338-3-4-7), no more than 3.1% of DHA (Event 3338-7-11-11), or no more than 4.7% of DPA (Event 3338-7-11-11) (see Table 8, 9), in soybean only (parag 81).

Applicants do not teach any oilseed or any oilseed plant, transgenic or otherwise, including any singly or plurally mutagenized plants containing elevated levels of PUFAs or Omega-3 fatty acids from non-plant species, or even plant PUFAs other than EPA, DHA, or DPA. Applicants do not teach any plant species with low levels of EPA, DPA, or DHA metabolite precursors. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Applicant is invited to point the line and page number defining "fatty acid" and "PUFA."

"Omega-3 fatty acid" is defined as ALA, and its long-chain metabolites, Eicosapentaneoic acid (EPA), docosapentaenoic acid (DPA), and docosahexanenoic acid (DHA) only. (*See* parag. 153).

The *Wands* court set forth the enablement test:

> Factors to be considered in determining whether a disclosure meets the enablement requirement of 35 USC 112, first paragraph, have been described by the court in *In re Wands*, 8 USPQ2d 1400 (CA FC 1988). Wands states at page 1404, "Factors to be considered in determining whether a disclosure would require undue experimentation have been summarized by the board in Ex parte Forman. They include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the 'claims."
> **M.P.E.P. § 2164.01(a)**

The Nature Of The Invention

The claims are drawn to oilseeds plants and plant parts, including transgenic oilseed plants. The invention is an class of invention which the CAFC has characterized

as "the unpredictable arts such as chemistry and biology." *Mycogen Plant Sci., Inc. v. Monsanto Co.*, 243 F.3d 1316, 1330 (Fed. Cir. 2001).

The Breadth Of The Claims

The claims broadly encompass *any* oilseed plant species or *any* oilseeds that produce seeds with total seed fatty acid profile comprising 1.0% - 60% of *any* polyunsaturated fatty acid having at least twenty carbon atoms and five or more carbon-carbon double bonds, including where the PUFA is an omega-3 fatty acid (FA), and including where the omega-3 FA is EPA, DPA, or DHA. The broad language expressly includes native, transgenic and mutagenized plants and plant parts.

Quantity Of Experimentation

The quantity of experimentation in this area is large since finding a plurally mutagenized plant with the Claimed composition alone would require years of effort and untold numbers of mutants containing mutations which were not desired. Furthermore, even via a transgenic plant route, because of position effects, the number of plants to screen is large and the effort to transform, cultivate, identify and screen desired transgenics is large. The amount of experimentation necessary to solve the problems associated with oil pathway manipulation, gene identification and metabolite pool level elucidation is very substantial, requiring extensive experimentation. This effort is an inventive, unpredictable and difficult undertaking in itself. This would require years of inventive effort, with each of the many intervening steps, upon effective reduction to practice, not providing any guarantee of success in the succeeding steps.

In Voelker et al., Applicant Kinney himself teaches that the quantity of experimentation for oil pathway manipulation can involve intensive research in several laboratories and yet remain elusive for some time. (Voelker, et al (2001) Plant Mol. Biol. 52, 335–361, p.336), p. 340, first full parag.).

The Unpredictability Of The Art And The State Of The Prior Art

There is abundant prior art to suggest that oil pathway manipulation is difficult, unpredictable and unsuccessful. A recent review by Deluca details a variety of problems seen in oil pathway manipulation. DeLuca teaches the unpredictability of altering plant biosynthetic pathways by genetically engineering plants, given a lack of understanding of plant metabolic pathways and their in vivo regulation (page 225N), and states that "on many occasions desired goals have been impossible to achieve" (page 228N).

In addition, Topfer et al specifically teach the unpredictability of altering hydroxylated fatty acids in a plant transformed with a fatty acid hydroxylase gene (page 684, the first column). Topfer et al teach that transformed tobacco plants had extremely low levels of ricinoleic acid and that this was probably due to factors present in tobacco tissues that did not allow the hydroxylated fatty acid to accumulate, and state that additional enzymes are probably required for the stable formation of ricinoleic acid at higher levels. Thus, the ability of other plant species to accumulate hydroxylated fatty acids at increased levels relative to non-transformed plants is highly unpredictable in light of the many other factors present in plant cells and tissues that affect this production.

Robert, S. teaches that "clearly soy is a much better vehicle for LC-PUFA production than flax or Arabidopsis for several reasons pertaining to substrate availability. (2005) Marine Biotechnology Vol. 8: 103-109) (*See* p. 106, left col. first full parag.). Robert was only able to make such statements after trial and error experimentation.

Previous experiments to change the fatty acid profiles of plant reserve triacylglycerols (TAG) by seed-specific expression of various enzymes have shown that the success of these manipulations cannot be reliably predicted (Abbadi, et al Plant Cell. 2004 October; 16(10): 2734–2748.at p. 2735, citing Voelker and Kinney, 2001; and Drexler et al., 2003).

Herbers et al., teaches that the success of pathway manipulation, much less than differences at the plant species level, can be affected by differences *in cultivar variety*. (p. 202, left col., first full parag.) Herbers recounts how an identical cloning strategy in one cultivar produced a 35% increase in the starch content of transgenic tubers while the same strategy in the same species, but a different cultivar, despite producing a fourfold increase in AGPase activity, produced no starch accumulation, however, because starch degradation was equally enhanced, and that this was possibly *explained by differences between the potato cultivars used.* (Herbers, et al., p. 202).

Working Examples

The specification has no working examples of transgenic plants other than soybean, no working examples singly or plurally mutagenized plants containing elevated levels of PUFAs or Omega-3 fatty acids from non-plant species, or even plant

or non-plant PUFAs other than EPA, DHA, or DPA nor any examples of nonstatutory wild-type plants with the Claimed composition (*See* 35 U.S.C. §101).

Guidance In The Specification.

The specification, while suggesting the use of the Δ-5 desaturase (SEQ ID NO: 37, 43), Δ-6 desaturase (SEQ ID NO:33, 35), and Δ-17 desaturase (SEQ ID NO: 41), did not provide significant guidance on how to overcome art recognized problems in establishing and modifying metabolic pathways, including oil pathways, including entirely non-native pathways, in plants for which the precursor compounds or large numbers of structural genes are required, nor how to identify singly or plurally mutagenized plants with the Claimed compositions. Moreover, Applicant has provided no guidance on selection of species which would have sufficient precursors to achieve the claimed levels of the Claimed PUFAs.

No guidance was given on how to identify oilseeds which would fail to yield the desired composition upon transformation with identical gene constructs as taught here.

Therefore, given the unpredictability of the genetic engineering of plants for the production of increased levels of oils including PUFAs; the lack of working examples other than that EPA, DHA, DPA PUFAs, the lack of working examples other than soybean; the absence of guidance with regard to PUFA mutants production and the absence of guidance with regard to the evaluation of other oils and other PUFAs, including non-plant or previously unknown PUFAs and given the breadth of the claims which encompass any PUFA oil from any plant species and having any or all of the PUFAs listed in claim 12; and given the state of the art which showed limited success

for EPA, DHA, DPA only in only one plant species, it would require undue experimentation by one skilled in the art to make and use the invention.

Claim Rejections - 35 U.S.C. §112, first paragraph, written description

8. Claims 1, 11, 12, 16-18, and 26-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant broadly claims any oilseed plant, including wild-type and mutant oilseed plant, from any plant species, including those with little or no PUFA pathway metabolic precursors, with any level of at least one polyunsaturated fatty acid PUFA, any of the approximately 300 FAs found in seed oils any Class-A LPAAT (Lysophosphatidic Acid Acyltransferase) containing oilseed species, any Class-B LPAAT containing oilseed species, any polyunsaturated fatty acid (PUFA), any omega-3 PUFA, omega-3 PUFAs to include DHA, DPA, EPA , seeds from such plants, soybean, Brassica species, sunflower, maize, cotton, flax, and safflower (parag 81).

Applicant describes a transgenic soybean comprising a total seed fatty acid profile with no more than 19.6% of EPA (Event 3338-3-4-7), no more than 3.1% of DHA (Event 3338-7-11-11), or no more than 4.7% of DPA (Event 3338-7-11-11) (*See* Table 8, 9; *See* parag 81).

Applicant does not describe any oilseed or any oilseed plant, including any singly or plurally mutagenized plants containing elevated levels of PUFAs, any Omega-3 fatty

acids from non-plant species, any Brassica species, sunflower, maize, cotton, flax, and safflower with 1-60% PUFA, including DHA, EPA, or DPA, any Class-A LPAAT containing oilseed species, any Class-B LPAAT containing oilseed species, or even plant PUFAs other than EPA, DHA, or DPA. Applicants do not teach any plant species with non-operatively low levels of EPA, DPA, or DHA metabolic precursors. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Robert's. teachings have been discussed supra. (2005) Marine Biotechnology Vol. 8: 103-109) (*See* p. 106, left col. first full parag.). According to Robert, other plant species would not yield the Claimed composition given a similar cloning and transformation strategy. Applicants selection of soybean was not random, but instead was done with knowledge that soybean contains high levels of PUFA precursors. Not all oilseed plants have the same metabolic pathways as soybean. Soybean is not representative of the Claimed genus of any oilseed plant. Soybean has unique pathways and metabolic pools such the transformation with the disclosed elements could yield the Claimed composition. Other oilseeds which do not have the high levels of PUFA precursors are not disclosed or adequately represented by a genus composed of only a single member, namely soybean.

The Federal Circuit has recently clarified the application of the written description requirement. The court stated that a written description of an invention "requires a precise definition, such as by structure, formula, [or] chemical name, of the claimed

subject matter sufficient to distinguish it from other materials." *University of California v. Eli Lilly and Co.*, 119 F.3d 1559, 1568; 43 USPQ2d 1398, 1406 (Fed. Cir. 1997). The court also concluded that "naming a type of material generally known to exist, in the absence of knowledge as to what that material consists of, is not a description of that material." Id. Further, the court held that to adequately describe a claimed genus, Patent Owner must describe a representative number of the species of the claimed genus, and that one of skill in the art should be able to "visualize or recognize the identity of the members of the genus." Id.

Finally, the court held:

> A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus. Id.

See also MPEP Section 2163, page 174 of Chapter 2100 of the August 2005 version, column 1, bottom paragraph, where it is taught that

> [T]he claimed invention as a whole may not be adequately described where an invention is described solely in terms of a method of its making coupled with its function and there is no described or art-recognized correlation or relationship between the structure of the invention and its function. A biomolecule sequence described only by a functional characteristic, without any known or disclosed correlation between that function and the structure of the sequence, normally is not a sufficient identifying characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence.

See also Amgen Inc. v. Chugai Pharmaceutical Co. Ltd., 18 USPQ 2d 1016 at 1021, (Fed. Cir. 1991) where it is taught that a gene is not reduced to practice until the inventor can define it by "its physical or chemical properties" (e.g. a DNA sequence).

Given the claim breadth and lack of guidance as discussed above, the specification fails to provide an adequate written description of the genus of sequences as broadly claimed. Given the lack of written description of the claimed genus of sequences, any method of using them, such as transforming plant cells and plants therewith, and the resultant products including the claimed transformed plant cells and plants containing the genus of sequences, would also be inadequately described. Accordingly, one skilled in the art would not have recognized Applicant to have been in possession of the claimed invention at the time of filing. *See* The Written Description Requirement guidelines published in Federal Register/ Vol. 66, No. 4/ Friday January 5, 2001/ Notices: pp. 1099-1111.

Remarks

9. No Claim is allowed. The closest art found was .32% by weight of C20:5 in cranberry. (5494684-US, 2/96, the table in Col. 2). The Claims are free of the prior art in light of the failure of the prior art to teach or reasonably suggest a transgenic oilseed plant containing at least 1% of one of either EPA, DHA, or DPA.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brendan O. Baggot whose telephone number is 571/272-5265. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on 571/272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Brendan O. Baggot
Patent Examiner
Art Unit 1638

DAVID H. KRUSE, PH.D.
PRIMARY EXAMINER

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